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Loeffler,
D.

Wood utilization and financial implications of fuel reduction treatments

Final Report

For

"Wood utilization and financial implications of fuel reduction treatments"

(03-JV-11222052-235)

Prepared
by

Dan Loeffler
(406-329-2120)
and
Hans Zuuring
(406-243-6456)

Department of Forest Management
College of Forestry & Conservation
The University of Montana
Missoula, MT 59812

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June 30, 2006

Approved by

J. Greg Jones, Project Leader

Date

USDA Forest Service
Rocky Mountain Research Station
Missoula, MT 59801

INTRODUCTION

This final report addresses the objectives associated with the above grant, the purpose of which was to "analyze the financial cost, potential utilization of wood products, and the associated market implications of different fuel reduction treatments on public and private lands."

METHODS

The following methods were used to complete the tasks outlined in the grant. The research study focused on two geographic areas: the Bitterroot National Forest in western Montana and the Front Range of central Colorado.

Bitterroot National Forest

Research conducted by the Bureau of Business and Economic Research at the University of Montana – Missoula has identified the capacity and capabilities of mills in the Bitterroot National Forest (BNF) timber processing area that produce manufactured wood products (Keegan, Morgan, and Spoelma 2004; Keegan and Morgan 2005). Capacity was defined as the total volume of timber (excluding pulpwood) that existing mills could utilize annually, and capability was defined as the volume of trees of a certain size class that existing mills can efficiently process annually. The major sources of information used to estimate timber flow, timber-processing capacity, and volumes of timber processed were periodic censuses and annual surveys of the forest products industry conducted by U of M BBER, U of I Dept. of Forest Products and WSU Dept. of Natural Resource Science on a regular basis. Follow-up telephone interviews were conducted with mill managers to update volumes of timber processed, as well as timber-processing capacity and capability to use trees of various sizes. The timber-processing

area for the BNF was determined to be those counties containing BNF non-reserved timberland and all those mills receiving timber harvested from those counties.

Colorado Rocky Mountain Front

Research conducted by the Bureau of Business and Economic Research at the University of Montana – Missoula has identified the capacity and capabilities of mills in a five-county region of Colorado's East Front of the Rocky Mountains (Spoelma and Keegan 2005). The data comes from the 2002 Forest Industries Data Collection System (FIDACS) census of mills in the Four Corners region.

RESULTS

The detailed results are presented in three attached reports in the form of tables and charts.

Bitterroot National Forest

Only one county in this location, Ravalli, was identified as having BNF non-reserved timberland. This research showed that the majority of mill capacity in Ravalli county was geared towards trees larger than 10" DBH (>70%). Industries identified as potential users of small trees include a pulp mill (Smurfit-Stone) in Missoula County and several small scale Fuels for Schools projects in and around the BNF timber processing area. Fuels for Schools facilities are each capable of utilizing 350 to 400 tons of biomass per year. Smurfit-Stone is capable of utilizing 300 tons per day; however, a substantial portion of Smurfit's used material is mill residue.

Montana timber processors (statewide) generated over 1.5 million tons of mill residues while statewide residue utilization was approximately 2.2 million tons in 2004. This shortfall means no excess residue exists to support renewable energy production; its feedstocks will need to be supplied entirely from other sources such as small, non-merchantable trees.

Capital costs for renewable energy production in the BNF area have been variable but decreasing steadily, and are likely to continue to do so as the efficiency of feasibility analyses continues to increase (pers. comm. Nick Salmon 2005). Capital costs, including a feasibility analysis for the Darby Fuels for Schools project approached one million dollars. Current estimates of installing a similar facility at Glacier High School in Kalispell, MT are approximately half the Darby costs. There are several Fuels for Schools projects in discussion or planning in western Montana presently, each one estimated to cost substantially less than the pilot project in Darby.

Biomass feedstock supply costs have been estimated for the BNF area and are housed at the Forestry Sciences Lab in Missoula, Montana. The BNF area comprises many different forest types and therefore supply stocks vary depending on forest type. We have found from FIA analysis that a minimum average of 8 to 15 green tons per acre of biomass is available depending on the prescription implemented. (We are analyzing three alternative prescriptions for the BNF). Depending on the harvest system, most of this biomass is available at reasonable delivered costs (Loeffler, Calkin and Silverstein 2006).

We will need to evaluate further what impediments to market creation in the BNF may be, however it is important to note at this time that lack of consistent supply is the most likely candidate reason.

Colorado Front Range

When the same research methodology was applied to the Front Range of Colorado (CFR) we were able to identify similar information. Five counties namely Douglas, El Paso, Jefferson, Park and Teller were identified along the Front as the likely timber processing area and timber

harvests and log destinations were tracked with the most current available data (2002). Nearly all the forestlands identified in the CFR via GIS analysis were lower-elevation ponderosa pine and/or ponderosa pine and Douglas fir mixtures. Our analysis of the FIA data from the CFR area shows these lands will yield a minimum average of approximately 18 green tons per acre of biomass. We found that only 14% of the small quantities of harvested timber were processed in the five county timber processing area of the CFR. Nearly 40% of all harvested timber is processed out of CO. Most of the capacity in the CFR is incapable of utilizing trees less than 7" DBH (biomass) and markets for this material are essentially non-existent (Spoelma and Keegan 2005).

There were few outlets for mill residue or renewable energy production identified. According to the Woody Biomass Program at the Office of Energy Management and Conservation, "the probability of seeing [electricity] production in Colorado at this point is extremely low." There are, however, a few scattered facilities using biomass for thermal energy, at the scale of Fuels for Schools projects, in Colorado, including facilities at Boulder County and Nederland. At this time, Colorado is not a member of the Fuels for Schools program so no large subsidies are available for rural renewable energy production. This is likely the largest of impediments to creating a market outlet for biomass – high capital and feedstock costs with less return than the next best alternative of fossil fuel. Further inquiry into existing or planned utilization for the CFR area is necessary in order to identify the long-run potential for biomass to be used for energy.

ATTACHMENTS

Three reports authored by Charles Keegan and others are included where tables and charts are located that summarize their findings. These previous reports supplement this report.

REFERENCES

Keegan, Charles E. and Todd A. Morgan. 2005. Montana Timber and Forest Products Industry Situation, 2004. Report to Senators Max Baucus and Conrad Burns and Representative Denny Rehberg. Bureau of Business and Economic Research, University of Montana, Missoula, Montana.

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Montana's Timber and Forest Products Industry Situation, 2004

Prepared by:

Charles E. Keegan
Director, Forest Industry Research

and

Todd A. Morgan
Assistant Director, Forest Industry Research
Bureau of Business and Economic Research
The University of Montana-Missoula

For:

Senator, Max Baucus
Senator, Conrad Burns
Representative, Dennis Rehberg

May 2, 2005

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Montana's Timber and Forest Products Industry Situation, 2004

Highlights

- Montana had over 19 million acres of nonreserved timberland in 2004, containing a net volume of timber of 35 billion cubic feet. Annual growth on Montana's timberland is 824 million cubic feet, while annual mortality is 377 million cubic feet, yielding net growth of 447 million cubic feet.

- Montana's estimated timber harvest in 2004 was approximately 160 million cubic feet or 700 million board feet Scribner, down from 1.2 billion board feet during the late 1980s. The decline in Montana's timber harvest can be attributed primarily to a 70 percent decline in harvest from national forests.

- Montana's forest products industry consisted of an estimated 205 manufacturers in 2004. Eighteen mills in Montana processed over 10 million board feet Scribner in 2004, down from 38 mills in 1976.

- The capacity of Montana's forest products industry to process timber was 963 million board feet Scribner (225 million cubic feet) in 2004, down from over 1.5 billion board feet during the 1980s. To continue to operate efficiently and competitively, Montana's timber processors will need about 800 MMBF Scribner (186 million cubic feet) annually.

- Capacity utilization during 2004 was 77 percent, meaning Montana's timber processors used 737 million board feet Scribner in their operations.

- Mill residue from Montana's timber processors is a major source of raw material and fuel for Montana's residue-utilizing facilities. These firms consume approximately 2.2 million dry tons (175 million cubic feet) annually. Montana's timber-processors generated over 1.5 million dry tons (120 million cubic feet) of residue during 2004. The remaining residue needs were filled by residue from outside the state or by processing timber directly into raw material or fuel.

- With no change in current harvest levels, Montana will likely see the closure of more than one of its largest timber processors, along with the shut-down of several smaller mills.

- A 15 percent decrease in Montana's annual timber harvest from current levels would cause the closure of four to six of the largest timber processors in Montana, in turn leading to substantial operational reductions for facilities processing mill residues.

- A 15 percent increase in Montana's annual timber harvest from current levels would sustain industry capacity at close to present levels.

Montana's Timber and Forest Products Industry Situation, 2004

Recent closures of timber-processing facilities in Montana have prompted concern about the future of Montana's forest products industry. Major issues facing the industry relate to timber-processing capacity remaining in the state and the level of harvest necessary to keep Montana's timber-processors operating efficiently.

This report attempts to address these issues by examining the size and condition of Montana's forest products industry, as well as the forest resources upon which the industry depends. The following topics are discussed:

- Standing timber volume, average annual growth, and average annual mortality on nonreserved timberland in Montana
- Volume of timber harvested and used in Montana
- Average size of timber harvested
- Number of timber-processing facilities in Montana
- Capacity of timber-processing facilities in Montana, and percent of capacity utilized
- Residue production from timber-processing facilities and capacity to utilize residue.

Also examined are three future timber harvest scenarios and how Montana's forest products industry may respond to them. These scenarios include harvest remaining at current levels, a 15 percent decline in harvest, and a 15 percent increase in harvest. By examining these scenarios, we hope to provide some insight into the possible future of Montana's forest products industry.

Background

For the past 30 years the Bureau of Business and Economic Research has monitored the forest products industry in Montana and the other Rocky Mountain states in cooperation with the U.S. Forest Service, Rocky Mountain Research Station, Interior West Forest Inventory and Analysis (IW-FIA) Program, located in Ogden, UT. Approximately five years ago, BBER began monitoring the forest products industry and timber harvests throughout the Pacific Coast States through research agreements with the Pacific Northwest FIA Program in Portland, OR.

Much of the information reported here - including methodology - is discussed in more detail in various documents listed in the references section. These include reports to Region One and the Washington Office of the U.S. Forest Service and an article accepted for publication in the *Forest Products Journal.* In an effort to present the information as succinctly as possible in this report to Montana's congressional delegation, we will present results and conclusions, while providing references to other documents for more detail on methodology.

The figures in this report are primarily for 2003 with preliminary estimates for 2004. The BBER is currently conducting a census of Montana's primary timber processors for 2004. This census, which is done every five years will provide very precise estimates of the number and types of facilities, production, sales, capacity, employment, as well as updating the volumes of timber harvested and used within the state.

Montana Timberland and Inventory

Timberland, Growth and Mortality (from USDA Forest Service IW-FIA): Montana had over 19 million acres of non-reserved timberland in 2004, with slightly more than two-thirds in public ownership (Table 1). The net volume of growing stock on non-reserved timberlands was approximately 35 billion cubic feet in 2004, with approximately 80 percent of the volume on public lands. Annual growth on non-reserved timberland is 824 million cubic feet (MMCF), while mortality is 377 MMCF annually, resulting in a current net annual growth of 447 MMCF on non-reserved timberlands.

Table 1: Montana Non-reserved Timberland Area, Standing Timber Inventory, Net Growth, and Mortality, 2004.

	Ownership Group		
	Public	Private	All
Area of timberland (acres)	12,796,599	6,248,962	19,045,561
Net volume of growing stock (thousand cubic feet)	28,486,076	6,478,751	34,964,828
Average annual **net growth** of growing stock (thousand cubic feet)	-	-	446,655
Average annual **mortality** of growing stock (thousand cubic feet)	-	-	376,733

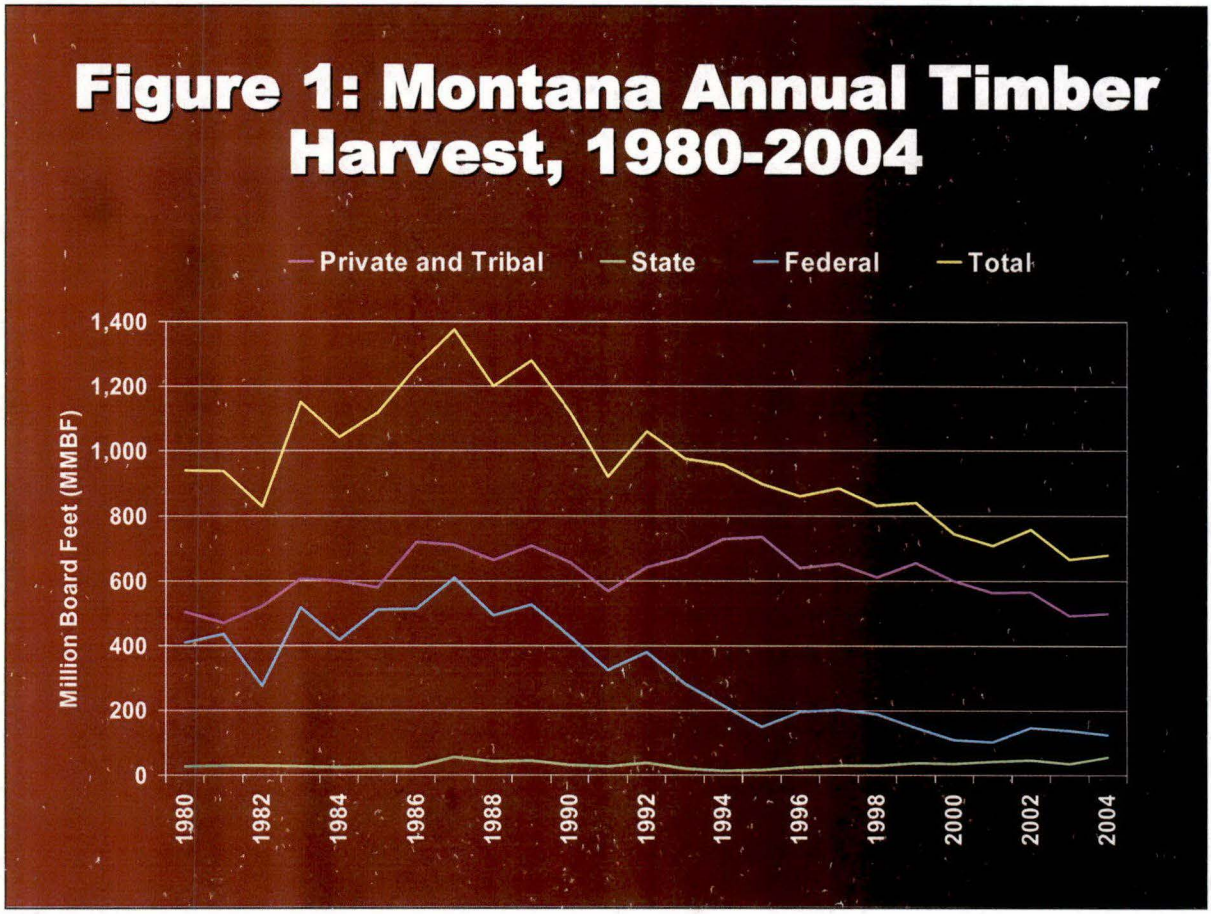
Timber Harvest 1980-2004 (from USDA Forest Service Region One and Keegan et al. 2001): Following the poor markets of the early 1980s, when Montana's timber harvest averaged 901 million board feet Scribner (MMBF), the state's harvest increased to just over 1.2 billion board feet annually for the remainder of the 1980s (Figure 1). A substantial decline in the volume of timber harvested began in 1990 and has continued through 2004 to an estimated harvest of slightly more than 700 MMBF (163 MMCF). The reduction can be attributed primarily to a 70 percent decline in timber harvested from national forests in Montana. A number of factors caused the declines in national forest timber harvests, including: appeals and litigation of timber sales, threatened and endangered species protection, cumulative effects of past harvesting, and reductions in U.S. Forest Service budgets.

Harvests from other ownership categories were relatively stable during the period with much of the year-to-year fluctuation driven by changing market conditions. Based on data for 2003, approximately 70 percent of the timber harvest in Montana was from private lands, national forests supplied 20 percent, and all other ownerships accounted for 10 percent.

Characteristics of Harvested Trees (from McLain 1992, Keegan et al. 2004a, and Morgan et al. 2005): Improvements in milling technology and changes in timber inventory have increased the proportionate use of smaller diameter trees and decreased the use of larger trees as borne out by repeated logging utilization studies.

In 1988, less than 50 percent of timber volume harvested for sawlogs in Montana came from trees smaller than 17 inches diameter at breast height (dbh). In 2002, 78 percent of

sawtimber harvest volume came from trees smaller than 17 inches dbh, and about 50 percent came from trees less than 13 inches dbh (Figure 2). Trees with dbh greater than 23 inches accounted for over 18 percent of harvest volume in 1988, but less than 4 percent in 2002.



Tree use (excluding pulpwood) by size class in Montana's timber-processing facilities is similar to harvest within the state. Of the 174 MMCF of timber used by Montana mills in 2003, less than 2 percent of volume was from trees smaller than 7 inches dbh, almost 12 percent was from trees 7 to 9.9 inches dbh, and slightly less than 87 percent (151 MMCF) was from trees 10 inches dbh or larger.

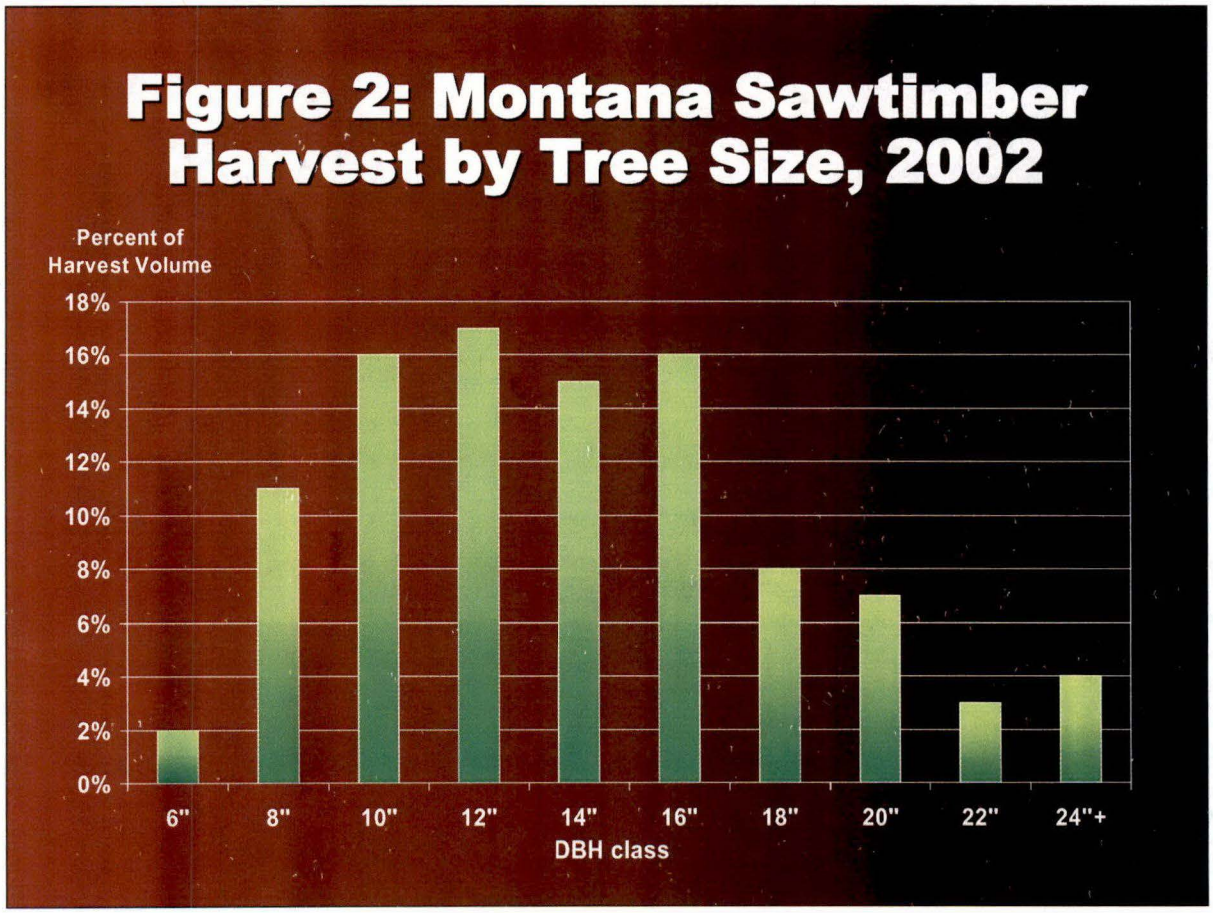
Montana's Forest Products Industry

Of the active forest products facilities in Montana, the overwhelming majority (193 in 2004) used timber in round form and will be referred to as timber-processing facilities; 12 used primarily mill residue and are dealt with separately.

Integration among Major Sectors: Some obvious integration exists in the forests products industry, for example between loggers and the mills that process the logs. A much less obvious but very important linkage exists between the mills that process timber (logs) and those that use

wood fiber by-products from timber processors. These by-products are generally referred to as mill residue or residuals.

When timber is processed into solid products such as lumber or plywood, less than half the wood fiber in the log delivered to the mill for initial processing actually becomes the primary finished product. The remaining wood fiber is not wasted. Rather, mill residue is the major source of raw material for three of the state's largest manufacturing facilities - a pulp and paper mill, a particleboard plant, and a medium density fiber board plant. Mill residue also provides raw material for a number of other users including producers of decorative bark, mulch, pelletized fuel, etc. Further, mill residue is an important source of fuel for the forest products industry.

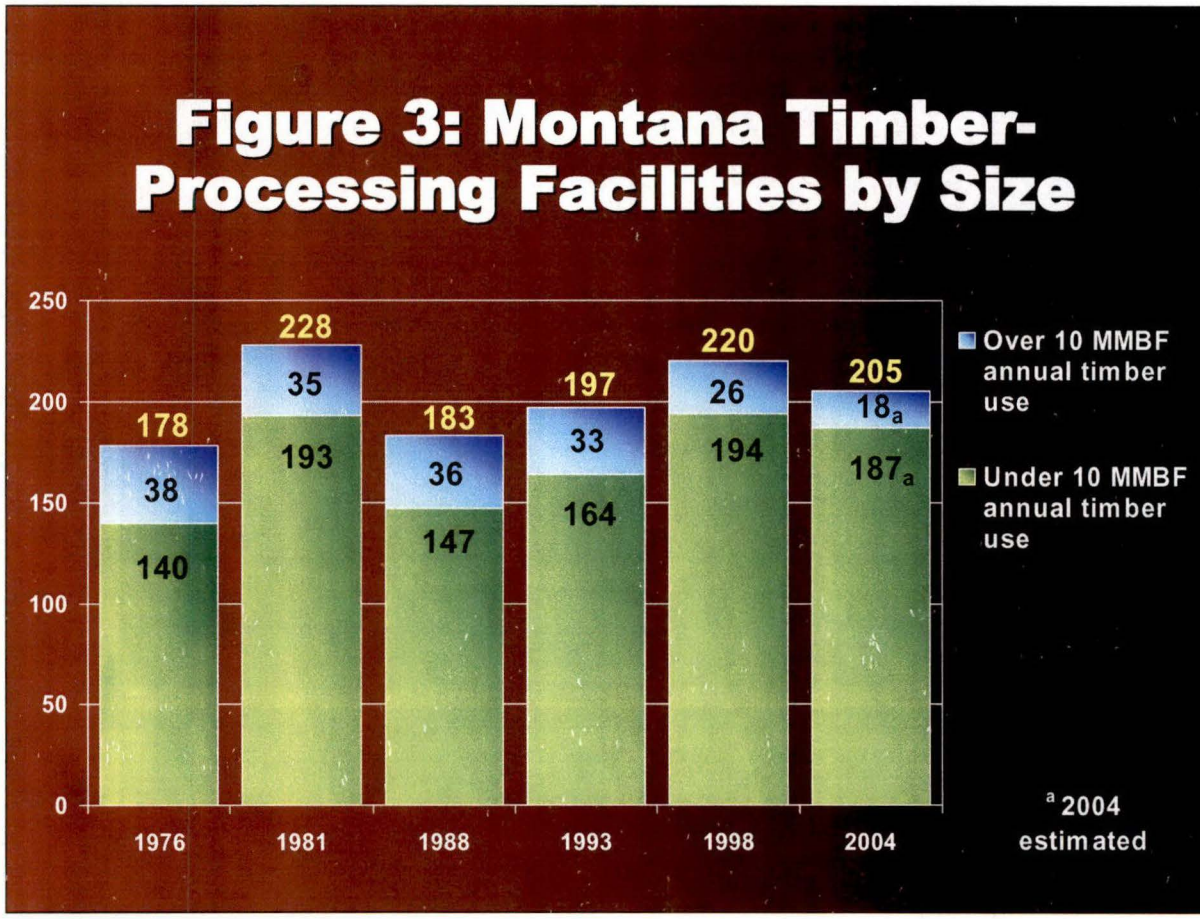


Obviously, the supply of mill residue is directly dependent on the volume of timber processed. In dealing with capacity, timber use, and harvest we will make estimates first for facilities based entirely on the direct use of timber in round-form and then examine production and consumption of mill residue.

Number and Size of Timber Processing Facilities (from Keegan et al. 2001, 2004a and 2004b)**:** The number of active timber-processing facilities in Montana has remained relatively stable over the last thirty years (Figure 3). The numbers have ranged from a low of approximately 178 facilities in 1976 to a high of 228 mills in 1981. At the end of 2004, there

were approximately 205 active timber-processing facilities in the state. These included 54 sawmills, 80 log home or house log manufacturers, three plywood plants, a pulp and paper mill, a particleboard plant, a medium density fiber board plant, and 65 additional facilities, such as log furniture makers and post and pole plants.

The major change when considering the number of facilities has been an increase in the number of small facilities (mills processing less than 10 MMBF of timber or, in the case of residue users, less than 5 MMCF of wood fiber annually) from 140 in 1976 to 187 in 2004. Conversely, the number of larger mills processing more than 10 MMBF or 5 MMCF of residue declined from 38 in 1976 to 18 in 2004.



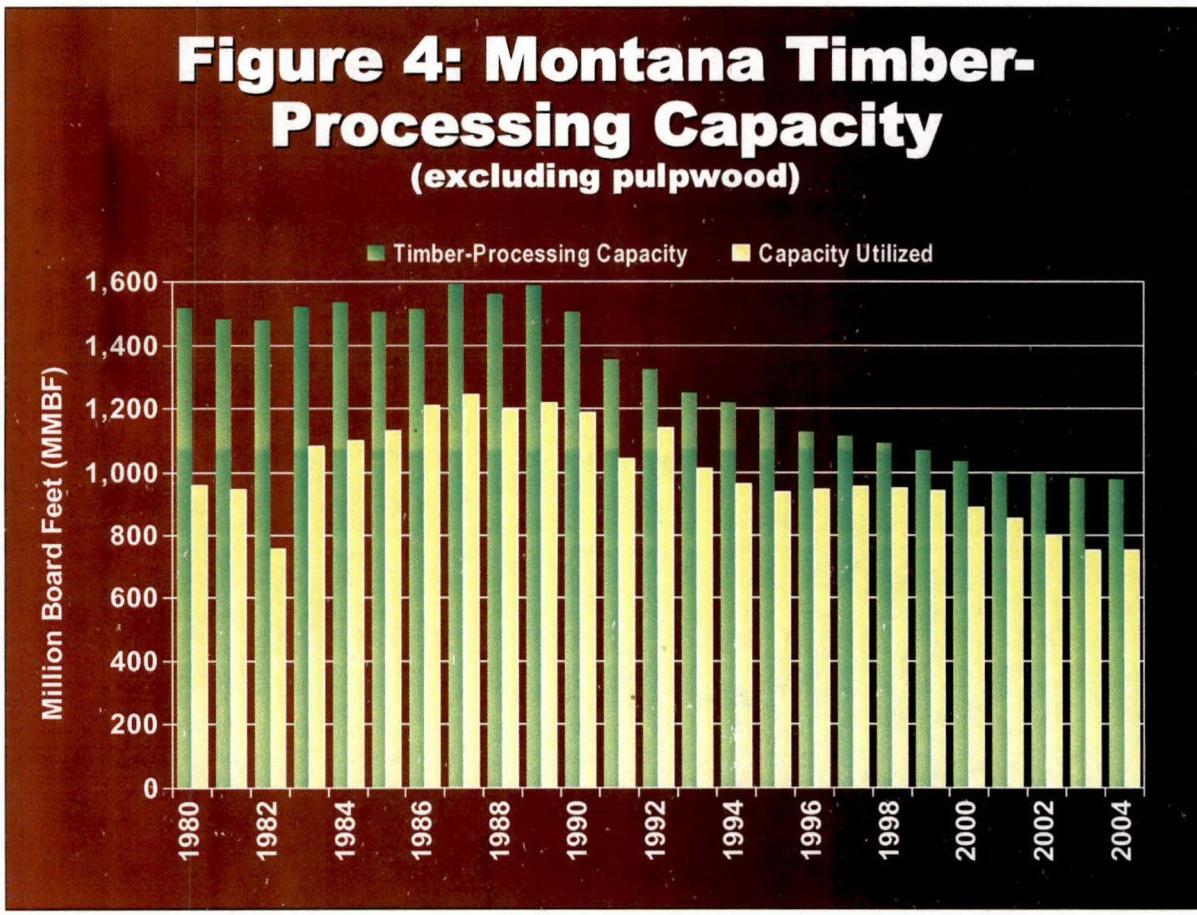
Simply tracking the number of mills in the state over time, even by size class, does not provide a precise analytical measure of the forest products industry's size or vitality. The increase or decrease in the number of operating facilities does not necessarily translate to a corresponding change in capacity to process timber or in production.

Montana's Timber-processing Capacity and Timber Use

Capacity refers to the annual volume of timber or mill residue that the state's industry could process assuming sufficient supplies of raw materials and firm market demand for products,

considering normal maintenance and down time. Capacity to process timber in this report is expressed in units of raw material input – board feet Scribner and cubic feet. For the residue-utilizing sector, capacity is expressed in dry tons (2,000 pounds of oven-dry wood fiber) and cubic feet.

Trends in Capacity (from Keegan et al. 2004a and 2004b)**:** Montana's timber processing capacity, after increasing slightly during the 1980s to just under 1.6 billion board feet Scribner (375 MMCF), declined by nearly 40 percent over the subsequent 15 years (Figure 4). Montana mills had a combined timber-processing capacity of 970 MMBF (227 MMCF) in 2003. The estimated annual capacity to process timber as of December 2004 was 963 MMBF (225 MMCF).



Capacity Utilization (from Keegan et al. 2001, 2004a, and 2004b)**:** Utilization of timber-processing capacity averaged 78 percent for the period 1980 through 2004, and has ranged from a low of 53 percent in the severe recession year of 1982 to 88 percent in 1999.

In 2003, Montana's 193 timber-processing facilities used approximately 750 MMBF (174 MMCF) of timber, utilizing approximately 77 percent of state-wide capacity. The total timber harvest in Montana during 2003 was approximately 684 MMBF Scribner, indicating 66 MMBF more timber was processed in Montana than was harvested. The difference between volume processed and in-state harvest came primarily from the net flow of logs into Montana. In 2004, estimates indicate that Montana mills processed 737 MMBF, again utilizing 77 percent of stated

capacity. The estimate of total timber harvest in Montana during 2004 was just over 700 MMBF, indicating that the net flow of logs into and out of Montana was nearly zero.

A key question in this analysis is: "What proportion of capacity would Montana's timber-processing industry need to utilize in order to make necessary capital investments and operate on a long term basis?" Based on discussion with timber-processing experts and industry representatives, as well as historic capacity and operating levels in Montana and other western states, this optimal operating level is between 80 and 85 percent of capacity. To maintain this level of capacity utilization, Montana's existing industry would need approximately 800 MMBF Scribner (186 MMCF) of timber annually.

Mill Residue Production and Consumption: In both 2003 and 2004, Montana timber-processing facilities generated just over 1.5 million dry tons (120 MMCF) of mill residue. Sawmills and plywood plants generate more than 95 percent of the mill residue produced in the state. The annual use of mill residue by Montana facilities for products and fuel in each of those years was approximately 2.2 million dry tons (175 MMCF). The remaining residue needs were filled by residue from outside the state or by processing timber directly into raw material or fuel.

Conclusions

No change in harvest from 2003-2004 levels: Current timber harvest levels in Montana, averaging approximately 690 MMBF (160 MMCF) annually, would be insufficient to sustain the current industry for the next decade. Even if Montana mills continued to receive timber from outside the state at levels comparable to 2003, it is highly likely that more than one of the larger and several of the smaller timber-processing mills in the state would close. Given changes in land and mill ownership in Western and Northwestern Montana, the net flow of timber from Idaho into Montana should decline from historic levels. In fact, the net flow of timber into Montana was nearly zero during 2004. Closures of more than one major timber-processing facility would negatively impact the residue-utilizing sector, perhaps leading to reduced capacity to utilize mill residue.

Decrease in Harvest: A 15 percent decrease in Montana's annual timber harvest to 587 MMBF would cause a shortfall of approximately 210 MMBF from the 800 MMBF needed to sustain the current timber-processing industry. With no net flow of timber into the state, this shortfall would be sufficient to cause the closure of four to six of the largest timber-processing mills in Montana, as well as several smaller mills. Losses of this magnitude would lead to substantial reductions in operating levels or closures among facilities that use mill residue.

Increase in Harvest: A 15 percent increase in Montana's annual timber harvest to 794 MMBF would meet virtually all of the current milling capacity needs in Montana and should sustain industry capacity at current levels, even with no net flow of timber into the state.

References

Keegan, C.E., K. Gebert, A.L. Chase, T.A. Morgan, S.E. Bodmer, D.D. Van Hooser. 2001. Montana's forest products industry: a descriptive analysis 1969-2000. The University of Montana-Missoula, Bureau of Business and Economic Research, Missoula, MT. 67 p.

Keegan, C.E., T.A. Morgan, F.G. Wagner, T.P. Spoelma, P.J. Cohn, K.A. Blatner and S.R. Shook. 2004a. "Timber Use, Processing Capacity, and Capability to Utilize Small-diameter Timber within USDA Forest Service, Region One Timber-processing Area" Report submitted to USDA Forest Service, Inventory and Monitoring Institute and Region One, Missoula MT. January 2004.

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TIMBER HARVEST AND PROCESSING CAPACITY/CAPABILITY IN COLORADO'S ROCKY MOUNTAIN FRONT

Prepared by:

Timothy P. Spoelma, Research Forester
Charles E. Keegan, Director of Forest Industry Research
Bureau of Business and Economic Research,
The University of Montana
June 21, 2005

This report briefly describes the timber harvest and the forest products industry's capacity and capability to process timber of various sizes in a five-county region of Colorado's East Front of the Rocky Mountains. "Capacity" refers to the total volume of timber that existing mills in the five-county region could utilize annually, and "capability" refers to the volume of trees of a certain size class that existing mills can efficiently process annually. Source data for this report is from the 2002 Forest Industries Data Collection System (FIDACS) census of mills in the Four Corners region conducted by The University of Montana's Bureau of Business and Economic Research.

Area of Interest

The area of interest for this report includes Douglas, El Paso, Jefferson, Park, and Teller Counties, Colorado (Fig. 1). These counties are situated along the East Front of the Rocky Mountains between Denver and Colorado Springs.

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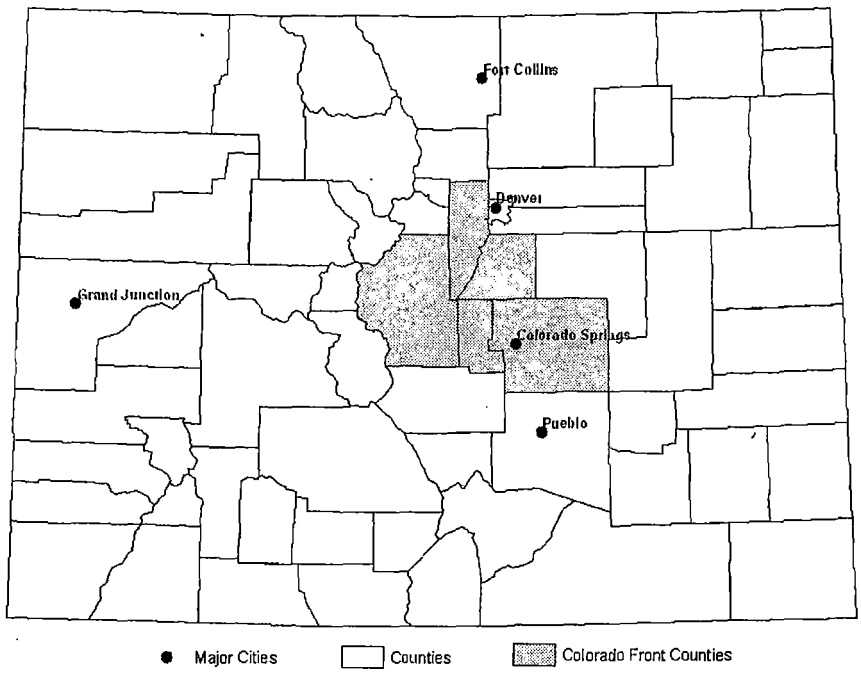
Figure 1: Area of Interest



Timber Harvest and Flow

Most of the timber harvested in the five-county region is processed outside of those five counties, and a substantial portion is processed outside of Colorado (Table 1). Sixty-nine percent of the volume harvested from the five counties in 2002 was from green (live) trees. The species composition of the volume harvested was: 34 percent spruce, 34 percent lodgepole pine, 20 percent ponderosa pine, 7 percent Douglas-fir, 3 percent true firs, and 2 percent quaking aspen. Nearly 78 percent of the volume harvested was used to produce lumber, 19 percent was used for house logs, and the remainder for posts, small poles, and log furniture.

Table 1: Timber harvest and flow in the five-county region.

	Volume (MBF, Scribner)
Processed within 5-county area	850
Processed in other Colorado counties	2,800
Processed out-of-state	2,400
Total harvest	6,050

Capacity to Process Timber

The forest products industry in the five-country region consisted of 14 manufacturers in 2002: 4 sawmills, 5 house log and log home manufacturers, and 5 manufacturers of roundwood products such as posts, small poles, and log furniture. The capacity to process timber in the five-county region is 2,480 MBF (560 MCF), with less than 70 percent (1,710 MBF; 380 MCF) being used annually. Most of the timber used is from trees 10+ in. dbh (Table 2).

Table 2: Annual volume of timber processed by tree size class for the five-county region.

Thousand Cubic Feet of timber		Thousand Board Feet Scribner of Timber	
Tree dbh	Volume used	Tree dbh	Volume used
< 7 in.	60	< 7 in.	60
7 - 9.9 in.	70	7 - 9.9 in.	270
10+ in.	250	10+ in.	1380
Total	380	Total	1710

Most of the capacity in the five-county region is incapable of efficiently utilizing trees < 10 in. dbh (Table 3). Slightly over 85 percent of the capacity to process trees < 7 in. dbh is currently used to process trees < 7 in. dbh, and over 75 percent of the capacity to process trees 7 -9.9 in. dbh is currently used to process trees 7 – 9.9 in. dbh. None of the capacity capable of processing trees in the < 7 and 7 -9.9 in. size classes is currently being used to process trees over 10 in. dbh. Less than 70 percent of the capacity not capable of processing trees < 10 in. dbh is currently being used.

Table 3: Annual total capacity and capability to process trees by tree size class for the five-county region.

Thousand Cubic Feet of timber		Thousand Board Feet Scribner of Timber	
Tree dbh	Capability	Tree dbh	Capability
< 7 in.	70	< 7 in.	70
7 - 9.9 in.	90	7 - 9.9 in.	340
10+ in.	400	10+ in.	2070
Total Capacity	560	Total Capacity	2480

*Note: Capability in < 7 and 7 - 9.9 in. classes is maximum volume capable of being used efficiently; capability in 10+ in. class is portion of total capacity not capable of efficiently using trees with dbh < 10 in.

Capacity and Capability of Mills in the Bitterroot National Forest Timber-Processing Area

Addendum to:
Timber Use, Processing Capacity, and Capability to Utilize Small-Diameter Timber Within USDA Forest Service, Region One Timber-processing Area
Submitted to:
USDA Forest Service, Region One
and
Inventory and Monitoring Institute
Challenge Cost-share Agreement #03-CS-1132463-241

Prepared by:

Charles E. Keegan
Director, Forest Industry Research

Todd A. Morgan
Research Forester

Timothy P. Spoelma
Research Forester

Bureau of Business and Economic Research
The University of Montana – Missoula

March 3, 2004

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Introduction

This report was prepared as a forest planning support document for the Bitterroot National Forest as part of Challenge Cost-share Agreement #03-CS-1132463-241, between the USDA Forest Service, Inventory and Monitoring Institute and The University of Montana's Bureau of Business and Economic Research (BBER).

In this report, "capacity" refers to the total volume of timber (excluding pulpwood) that existing mills could utilize annually, and "capability" refers to the volume of trees of a certain size class that existing mills can efficiently process annually. The major sources of information used to estimate timber flow, timber-processing capacity, and volumes of timber processed were periodic censuses and annual surveys of the forest products industry (see attached Region One report). These censuses and surveys are performed on a regular basis by the BBER, the University of Idaho's Department of Forest Products, and the Department of Natural Resource Science at Washington State University. Follow-up telephone interviews with mill managers, conducted between May and August 2003, were used to update volumes of timber processed, as well as timber-processing capacity and capability to use trees of various sizes. Volumes of timber reported as harvested or processed include timber used to produce manufactured wood products (e.g., lumber, veneer, plywood, posts, utility poles, log homes, and log furniture). The roundwood pulpwood and industrial fuelwood components of the harvest are dealt with separately in the Region One report.

Timber-processing area

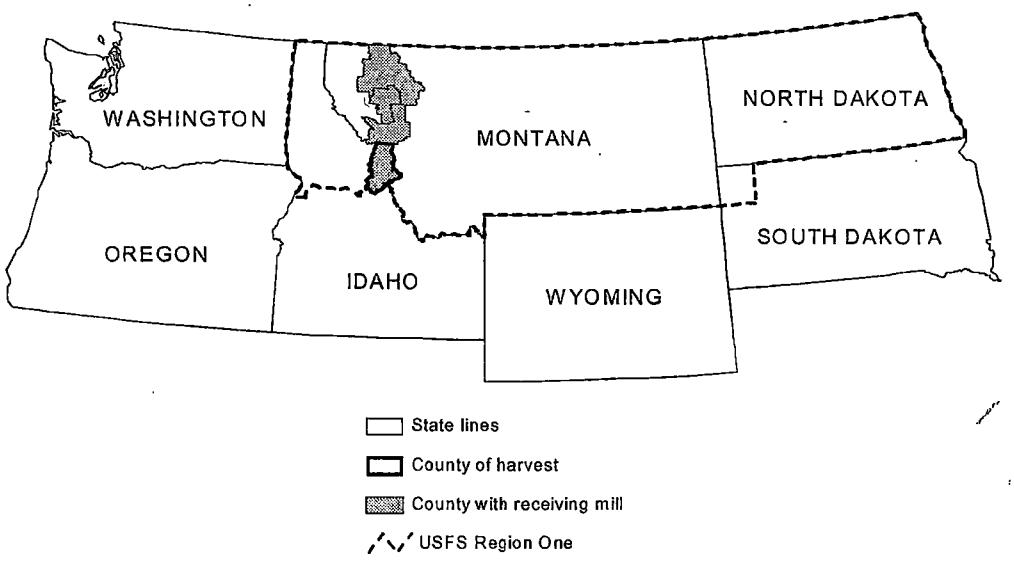
The following steps were taken to determine the timber-processing area for the Bitterroot National Forest:

1. Counties containing Bitterroot National Forest non-reserved timberland were identified.
2. Using BBER databases, timber harvest and flow was analyzed for all ownerships within the above counties.
3. Based on this timber harvest and flow analysis, all mills receiving timber harvested from those counties that contain Bitterroot National Forest non-reserved timberland were identified.
4. The counties with the above mills were designated as the Bitterroot National Forest Timber-Processing Area.

Destinations of small volumes (< 50 thousand cubic feet) of timber that moved extraordinarily long distances were not included in the final delineation of the timber-processing area. The mills and associated counties receiving these volumes--often for specialty products such as house logs--were not included because these long-distance flows of timber have not occurred repeatedly or consistently.

Bitterroot National Forest non-reserved timberland is located in one Montana county--Ravalli (Figure 1). Slightly more than 54 percent of the recent (1998) timber harvest in Ravalli County originated from the Bitterroot National Forest. Most (75 percent) of the timber harvested consisted of green (live) trees. The species composition of the harvested volume in Ravalli County was: lodgepole pine 29 percent, ponderosa pine 28 percent, Douglas-fir 20 percent, and true firs 10 percent. Engelmann spruce accounted for about 7 percent, and western larch accounted for the remaining 6 percent of the 1998 harvest in Ravalli County. Sawmills received about 68 percent of the timber harvested from Ravalli County, while veneer/plywood manufacturers received about 6 percent. House logs, posts, and small poles combined accounted for about 4 percent of the timber harvest volume. Roundwood pulpwood accounted for about 22 percent and is dealt with in the Region One report.

Figure 1: Bitterroot National Forest Timber-Processing Area



The Bitterroot National Forest Timber Processing Area (TPA) is the four-county area with mills that receive timber from Ravalli County. The counties comprising the Bitterroot National Forest TPA are Flathead, Lake, Missoula, and Ravalli counties in Montana (Figure 1). Within the Bitterroot National Forest TPA there are 89 facilities currently operating: 38 log home manufacturers, 21 sawmills, 14 post and small pole plants, 13 log furniture manufacturers, and three veneer and plywood facilities. Additionally, a pulp mill and particleboard plant are located in Missoula County, and a medium density fiberboard plant is located in Flathead County. The use of roundwood is discussed in the Region One report.

Current conditions and capacity

Across Region One, about 80 percent of annual timber-processing capacity is being utilized (see attached Region One report). Capacity to process timber in the Bitterroot National Forest TPA is 116,216 thousand cubic feet (MCF), with slightly more than 81 percent of capacity being used annually.

Table 1. Annual Volume of Timber Processed by Tree Size Class (Excluding Pulpwood) for the Bitterroot National Forest Timber Processing Area, 2003

Thousand Cubic Feet of Timber		Thousand Board Feet Scribner of Timber	
Tree dbh	**Volume Used**	**Tree dbh**	**Volume Used**
<7 in	1,130	<7 in	1,130
7-9.9 in	11,547	7-9.9 in	44,340
10+ in	82,008	10+ in	384,119
Total	94,685	Total	429,589

Mills in the Bitterroot National Forest TPA are currently using about 94,685 MCF of timber annually (Table 1). Slightly less than 87 percent (82,008 MCF) of the volume processed in the TPA is composed of trees with diameter at breast height (dbh) ≥ 10". About 12 percent (12,677 MCF) of the volume processed comes from trees 7.0 - 9.9" dbh, while slightly more than 1 percent (1,130 MCF) of processed volume comes from trees < 7" dbh.

Most facilities are designed to operate using trees of a given size class (e.g., veneer/ plywood plants, which typically use trees ≥ 10" dbh, or post manufacturers, which use trees < 7" dbh). Capacity at these facilities was readily classified as being capable of processing timber of just one of the size classes. This was true for some sawmills, but sawmills vary greatly in equipment, product output, and ability to process timber of various sizes.

Mills often process trees that are larger than the smallest tree sizes they are capable of processing. In other words, most mills capable of efficiently processing trees 7 – 9.9" dbh are also capable of processing trees ≥ 10" dbh, and indeed these mills do process substantial volumes of these larger trees. However, some mills that process larger trees are not capable of processing smaller-diameter trees. For this reason, this report presents capability to process trees ≥ 10" dbh as the proportion of total capacity not capable of efficiently using trees < 10" dbh. Whereas, capability to process trees < 7" dbh and 7 – 9.9" dbh are presented as maximum volumes of trees of these size classes that can be processed efficiently.

Financial feasibility analyses, involving repeated simulations of processing logs of a range of sizes through different sawmill configurations (see attached Region One report), were used to estimate the potential for individual sawmills to use trees in each size class. In some cases, particularly where a mill has both small- and large-log capability, expert opinion was employed to estimate the proportion of smaller trees the mill is capable of using.

Table 2. Annual Total Capacity and Capability* to Process Trees by Size Class (Excluding Pulpwood) for the Bitterroot National Forest Timber Processing Area, 2003

Thousand Cubic Feet of Timber		Thousand Board Feet Scribner of Timber	
Tree dbh	**Capability**	**Tree dbh**	**Capability**
<7 in	4,449	<7 in	4,449
7-9.9 in	25,677	7-9.9 in	98,600
10+ in	86,090	10+ in	424,223
Total Capacity	116,216	Total Capacity	527,271

* Note: Capability in <7 and 7-9.9 in. classes is maximum volume capable of being used efficiently; capability in 10+ in. class is portion of total capacity NOT capable of efficiently using trees with dbh<10 in.

About 74 percent (86,090 MCF) of the 116,216 MCF of existing capacity in the Bitterroot National Forest TPA is not capable of efficiently utilizing trees < 10" dbh (Table 2). Slightly more than 30,000 MCF of timber-processing capacity is capable of utilizing trees < 10" dbh, and most of this is in the 7 - 9.9" dbh class. A substantial amount of the capacity capable of utilizing smaller diameter trees is being used to process larger trees or going unused. About 25 percent of capacity in the < 7" dbh category is currently utilized to process trees < 7" dbh, and slightly less than 45 percent of capacity in the 7 - 9.9" dbh category is being used to process trees 7 - 9.9" dbh. More than 12,600 MCF of capacity capable of using trees 7 - 9.9" dbh are used annually to process trees ≥ 10" dbh.